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Health and Environmental Effects Profile for 1-Amino-2-Naphthol and 1-Amino-2-Naphthol Hydrochloride

(U.S.) Environmental Protection Agency
Cincinnati, OH

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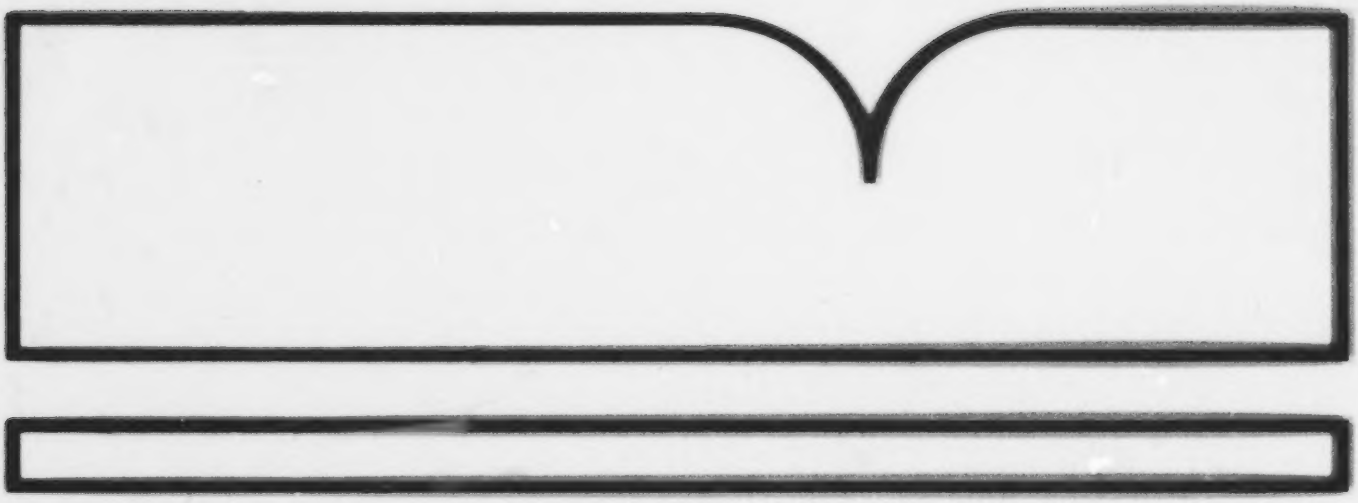

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16. ABSTRACT

The Health and Environmental Effects Profile for 1-amino-2-naphthol and 1-amino-2-naphthol hydrochloride was prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Solid Waste and Emergency Response to support listings of hazardous constituents of a wide range of waste streams under Section 3001 of the Resource Conservation and Recovery Act (RCRA) and to provide health-related limits for emergency actions under Section 101 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Both published literature and information obtained from Agency program office files were evaluated as they pertained to potential human health, aquatic life and environmental effects of hazardous waste constituents.

Quantitative estimates have been presented provided sufficient data are available. Existing data are insufficient to determine a Reference Dose (RfD) or a carcinogenic potency factor for 1-amino-2-naphthol and 1-amino-2-naphthol hydrochloride.

The Reportable Quantity (RQ) value of 1, 10, 100, 1000 or 5000 pounds is used to determine the quantity of a hazardous substance for which notification is required in the event of a release as specified by CERCLA based on chronic toxicity. Existing data are insufficient to determine an RQ value.

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HEALTH AND ENVIRONMENTAL EFFECTS PROFILE FOR 1-AMINO-2-NAPHTHOL AND 1-AMINO-2-NAPHTHOL HYDROCHLORIDE

ENVIRONMENTAL CRITERIA AND ASSESSMENT OFFICE
OFFICE OF HEALTH AND ENVIRONMENTAL ASSESSMENT
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PREFACE

Health and Environmental Effects Profiles (HEEPs) are prepared for the Office of Solid Waste and Emergency Response by the Office of Health and Environmental Assessment. The HEEPs are intended to support listings of hazardous constituents of a wide range of waste streams under Section 3001 of the Resource Conservation and Recovery Act (RCRA), as well as to provide health-related limits for emergency actions under Section 101 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Both published literature and information obtained from Agency program office files are evaluated as they pertain to potential human health, aquatic life and environmental effects of hazardous waste constituents. The literature searched and the dates of the searches are included in the section titled "Appendix: Literature Searched." The literature search material is current through November, 1985.

Quantitative estimates are presented provided sufficient data are available. For systemic toxicants, these include Reference doses (RfDs) for chronic exposures. An RfD is defined as the amount of a chemical to which humans can be exposed on a daily basis over an extended period of time (usually a lifetime) without suffering a deleterious effect. In the case of suspected carcinogens, RfDs are not estimated in this document series. Instead, a carcinogenic potency factor of q_1^* is provided. These potency estimates are derived for both oral and inhalation exposures where possible. In addition, unit risk estimates for air and drinking water are presented based on inhalation and oral data, respectively.

Reportable quantities (RQs) based on both chronic toxicity and carcinogenicity are derived. The RQ is used to determine the quantity of a hazardous substance for which notification is required in the event of a release as specified under CERCLA. These two RQs (chronic toxicity and carcinogenicity) represent two of six scores developed (the remaining four reflect ignitability, reactivity, aquatic toxicity and acute mammalian toxicity).

The first draft of this document was prepared by Syracuse Research Corporation under EPA Contract No. 68-03-3228. The document was subsequently revised after reviews by staff within the Office of Health and Environmental Assessment: Carcinogen Assessment Group, Reproductive Effects Assessment Group, Exposure Assessment Group, and the Environmental Criteria and Assessment Office in Cincinnati.

The HEEPs will become part of the EPA RCRA and CERCLA dockets.

ACKNOWLEDGEMENTS

The initial draft of this report was prepared by Syracuse Research Corporation under Contract No. 68-03-3228 for U.S. EPA's Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH. Dr. Christopher DeRosa was the Technical Project Monitor and Helen Ball was the Project Officer. The final documents in this series were prepared for the Office of Solid Waste, Washington, DC.

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EXECUTIVE SUMMARY

1-Amino-2-naphthol and its hydrochloride salt are solids at room temperature. At high temperatures, these compounds decompose to produce toxic fumes of NO_x, and also HCl in the case of the hydrochloride salt. Both compounds are soluble in alcohol. 1-Amino-2-naphthol is sparingly soluble in water but the hydrochloride salt is slightly more water soluble (Sax, 1984; Weast, 1980). U.S. EPA (1977) listed one manufacturer of 1-amino-2-naphthol, although its identity, location and production volume were confidential. It also listed Eastman-Kodak in Rochester, NY, as the only U.S. manufacturer of 1-amino-2-naphthol•HCl, although Kodak reported no production of this compound during that year. Recent sources of production information listed no manufacturers or suppliers of 1-amino-2-naphthol or its hydrochloride salt. 1-Amino-2-naphthol may be used as a chemical intermediate and there may be little, if any, commercial use for 1-amino-2-naphthol•HCl.

In water, 1-amino-2-naphthol and its hydrochloride salt should not be susceptible to substitution reactions (hydrolysis). Potential exists for direct photolysis of both these compounds in water, and the presence of algae may accelerate photodegradation. Bioaccumulation in aquatic organisms should not be significant. Physical adsorption of 1-amino-2-naphthol and its hydrochloride to suspended solids and sediments may not be a significant fate process.

In air, vapor phase 1-amino-2-naphthol and its hydrochloride salt may be degraded by reaction with photochemically generated HO radical or by direct photolysis. The hydroxyl reaction half-life of 1-amino-2-naphthol is

estimated to be 12.66 hours. Reaction with ozone may occur, but no rate constant was located. Dissolution into and removal by rain may be a potential transport process for 1-amino-2-naphthol•HCl.

In soil, 1-amino-2-naphthol and its hydrochloride salt should not be susceptible to substitution reactions (hydrolysis). 1-Amino-2-naphthol and its hydrochloride are likely to be mobile in soil.

Pertinent data regarding the monitoring of 1-amino-2-naphthol or its hydrochloride could not be located in the available literature as cited in the Appendix.

Pertinent data regarding the toxicity of 1-amino-2-naphthol and 1-amino-2-naphthol•HCl to aquatic organisms could not be located in the available literature as cited in the Appendix.

Pertinent data regarding the absorption, distribution, metabolism or excretion of 1-amino-2-naphthol and 1-amino-2-naphthol•HCl could not be located in the available literature as cited in the Appendix.

Implantation of paraffin pellets containing 1-amino-2-naphthol•HCl into the bladders of mice resulted in an increased number of carcinomas, benign tumors and areas of squamous metaplasia after 40 weeks compared with mice implanted with paraffin only (Bonser et al., 1956). 1-Amino-2-naphthol•HCl was not mutagenic to S. typhimurium with or without metabolic activation (Garner and Nutman, 1977; Chung et al., 1981). Although Fluck et al. (1976) found that 1-amino-2-naphthol was positive in a rec assay in E. coli, these investigators speculated that the positive result may have been due to the oxidizing potential of the compound. 1-Amino-2-naphthol was not mutagenic to E. coli in a reverse mutation assay without activation (Perez and Radomski, 1965). Information was not found on the teratogenic or reproductive effects or on the systemic toxicity after subchronic or chronic ingestion or inhalation of 1-amino-2-naphthol or 1-amino-2-naphthol•HCl.

When mice were fed the compound for 10 days after partial hepatectomy, the result was a significant increase in the mass of regenerated liver tissue (Gershbein, 1982).

The lack of teratology, reproductive and subchronic or chronic toxicities precludes the derivation of an RfD or RQ for 1-amino-2-naphthol and its hydrochloride. The study by Bonser et al. (1956) provided limited evidence that 1-amino-2-naphthol•HCl is carcinogenic to animals, but the lack of pathology specifics provides an uncertainty as to the significance of the response and precluded the derivation of a q_1^* or F factor. Because adequate data for animals and humans are lacking, these chemicals are most appropriately classified as EPA Group D chemicals, that is, not classifiable as to their human carcinogenicity.

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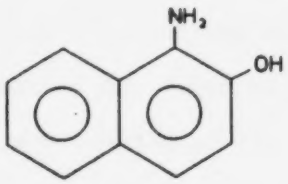
LIST OF ABBREVIATIONS

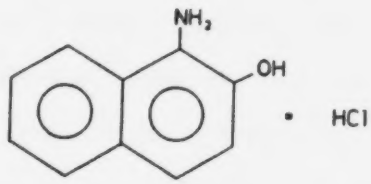
CAS	Chemical Abstract Service
K_{oc}	Soil sorption coefficient standardized with respect to organic carbon
K_{ow}	Octanol/water partition coefficient
LD_{50}	Dose lethal to 50% of recipients
ppm	Parts per million
RQ	Reportable quantity
RV_d	Dose-rating value
RV_e	Effect-rating value
TD_{LO}	Lowest toxic dose
UV	Ultraviolet

1. INTRODUCTION

1.1. STRUCTURE AND CAS NUMBER

1-Amino-2-naphthol is also known as 1-amino-2-naphthalenol and 2-hydroxy-1-naphthylamine. 1-Amino-2-naphthol hydrochloride is also known as 1-amino-2-naphthalenol, hydrochloride, and 2-hydroxyl-1-naphthylamine hydrochloride. The structures, molecular weights, empirical formulas and CAS numbers for 1-amino-2-naphthol and its hydrochloride salt are as follows:





Molecular weight:	159.19	195.66
Empirical formula:	$C_{10}H_9NO$	$C_{10}H_{10}ClNO$
CAS Registry number:	2834-92-6	1198-27-2

1.2. PHYSICAL AND CHEMICAL PROPERTIES

1-Amino-2-naphthol and its hydrochloride salt are solids at room temperature and are soluble in alcohol (Weast, 1980; Sax, 1984). At high temperatures, these compounds decompose to produce toxic fumes of NO_x and also HCl in the case of the hydrochloride salt (Sax, 1984). Selected physical properties for 1-amino-2-naphthol (and its hydrochloride salt) are as follows:

Melting point:	150°C (decomposes) (1-amino-2-naphthol) 201°C (1-amino-2-naphthol•HCl)	Weast, 1980 Sax, 1984
Water solubility:	882 mg/ℓ (1-amino-2-naphthol) (25°C) (calculated from K_{ow})	Lyman et al., 1982
Log K_{ow}:	1.82 (1-amino-2-naphthol) (calculated)	U.S. EPA, 1986a

BCF:	14 (1-amino-2-naphthol) (calculated)	Lyman et al., 1982
K_{oc}:	105 (1-amino-2-naphthol) (calculated)	Lyman et al., 1982

1-Amino-2-naphthol•HCl is slightly soluble in water (Sax, 1984). The K_{ow}, BCF and K_{oc} values for the hydrochloride salt are expected to be lower than 1-amino-2-naphthol because of its higher water solubility.

1.3. PRODUCTION DATA

U.S. EPA (1977) listed one manufacturer of 1-amino-2-naphthol, but all related information was reported to be confidential; however, the use of this compound was reported as site-limited. Eastman-Kodak in Rochester, NY, was listed as the only manufacturer of 1-amino-2-naphthol•HCl, although Kodak reported no production of this compound in 1977 (U.S. EPA, 1977). No manufacturers or suppliers of 1-amino-2-naphthol or 1-amino-2-naphthol•HCl were listed in recent sources of production information. Data regarding processes for commercial production of 1-amino-2-naphthol and its hydrochloride salt could not be located in the available literature.

1.4. USE DATA

Information regarding the use of 1-amino-2-naphthol and its hydrochloride salt could not be located in the available literature. Site-limited use of 1-amino-2-naphthol by its only reported manufacturer suggests that this compound may be used as a chemical intermediate. Limited production data on 1-amino-2-naphthol•HCl suggests there is little, if any, commercial use for this compound (see Section 1.3.).

1.5. SUMMARY

1-Amino-2-naphthol and its hydrochloride salt are solids at room temperature. At high temperatures, these compounds decompose to produce toxic fumes of NO_x, and also HCl in the case of the hydrochloride salt.

Both compounds are soluble in alcohol. 1-Amino-2-naphthol is sparingly soluble in water but the hydrochloride salt is slightly more water soluble (Sax, 1984; Weast, 1980). U.S. EPA (1977) listed one manufacturer of 1-amino-2-naphthol, although its identity, location and production volume were confidential. It also listed Eastman-Kodak in Rochester, NY, as the only U.S. manufacturer of 1-amino-2-naphthol•HCl, although Kodak reported no production of this compound during that year. Recent sources of production information listed no manufacturers or suppliers of 1-amino-2-naphthol or its hydrochloride salt. 1-Amino-2-naphthol may be used as a chemical intermediate and there may be little, if any, commercial use for 1-amino-2-naphthol•HCl.

2. ENVIRONMENTAL FATE AND TRANSPORT PROCESSES

Pertinent data regarding the environmental fate and transport of 1-amino-2-naphthol and its hydrochloride salt could not be located in the available literature as cited in the Appendix. When possible, this information has been derived from physical property data or molecular structure.

2.1. WATER

2.1.1. Hydrolysis. Aromatic amines, aromatic nitro compounds and polycyclic aromatic hydrocarbons are generally resistant to hydrolysis (Lyman et al., 1982); thus, 1-amino-2-naphthol and its hydrochloride salt should not be susceptible to substitution reactions (hydrolysis).

2.1.2. Photolysis. 1-Amino-2-naphthol and 1-amino-2-naphthol•HCl in methanol, acid and base strongly absorb UV light in the environmentally significant range (wavelengths >290 nm) (Sadtler, 1974a,b) indicating that the potential exists for direct photolysis in aqueous solution for both compounds. Screening studies indicate that green and blue-green algae at concentrations of 1-10 mg/ℓ of chlorophylla/ℓ accelerate the photoreaction of certain polycyclic aromatic hydrocarbons in water (Zepp and Schlotzhauer, 1983). Whether such acceleration will occur in the cases of 1-amino-2-naphthol and its hydrochloride salt is not known.

2.1.3. Bioaccumulation. Based on the calculated log K_{ow} for 1-amino-2-naphthol, a BCF of 14 has been calculated using the following equation (Lyman et al., 1982): log BCF = 0.76 log K_{ow} - 0.23. Considering this BCF value and the suspected higher water solubility of 1-amino-2-naphthol•HCl, both 1-amino-2-naphthol and its hydrochloride salt should not bioconcentrate significantly in aquatic organisms.

2.1.4. **Adsorption.** For 1-amino-2-naphthol, given its calculated K_{oc} of 105, physical adsorption to suspended solids and sediments in water may not be significant. For 1-amino-2-naphthol•HCl, given its higher water solubility than the parent compound, physical adsorption to suspended solids and sediments in water may be even less significant. Parris (1980) reported that aromatic amines (ring-substituted anilines) covalently bind to widely occurring humic materials by a rapid but reversible reaction, followed by a slower but not so readily reversible reaction. Whether such covalent binding with humic materials by 1-amino-2-naphthol and its hydrochloride salt will occur remains uncertain.

2.2. AIR

2.2.1. **Oxidation.** The rate constant for the reaction of vapor phase 1-amino-2-naphthol with photochemically generated HO radical has been calculated to be 1.185×10^{-14} cm^3/molecule-sec at 25°C (U.S. EPA, 1986b). Assuming an ambient atmospheric HO radical concentration of 8.0×10^5 molecules/cm^3 (U.S. EPA, 1986b), the HO radical reaction half-life has been calculated to be 12.66 hours. (Since fused aromatic rings are part of the structure of 1-amino-2-naphthol, an alkyl attachment was assumed in the derivation of the reaction rate constant, possibly resulting in an estimation error.) Since the compound reacts with oxidizing radicals it is likely it will also react with ozone, but no rate constant was found for the reaction. According to U.S. EPA (1986b), 1-amino-2-naphthol is not likely to react with ozone.

2.2.2. **Photolysis.** Strong adsorption of UV light wavelengths >290 nm by 1-amino-2-naphthol and its hydrochloride (see Section 2.1.2.) suggests that direct photolysis in the atmosphere is a potential removal mechanism for these compounds.

2.2.3. Physical Transport. Cupitt (1980) suggested that adsorption onto airborne particulate matter is a reasonable vapor phase removal mechanism only for compounds with vapor pressures $\leq 10^{-7}$ mm Hg. Data regarding the importance of adsorption of 1-amino-2-naphthol and its hydrochloride salt onto airborne particulate matter is not available. Based on the suspected higher water solubility of 1-amino-2-naphthol•HCl, dissolution into and removal by rain may be a potential transport process.

2.3. SOIL

2.3.1. Hydrolysis. 1-Amino-2-naphthol and its hydrochloride salt should not be susceptible to hydrolysis (see Section 2.1.1.).

2.3.2. Adsorption. The K_{oc} value of 1-amino-2-naphthol has been estimated to be 105 (see Section 1.2.). Based on this estimated K_{oc} value, 1-amino-2-naphthol is predicted to be mobile in soil (Swann et al., 1983). 1-Amino-2-naphthol•HCl is likely to be much more mobile than 1-amino-2-naphthol.

2.4. SUMMARY

In water, 1-amino-2-naphthol and its hydrochloride salt should not be susceptible to substitution reactions (hydrolysis). Potential exists for direct photolysis of both these compounds in water, and the presence of algae may accelerate photodegradation. Bioaccumulation in aquatic organisms should not be significant. Physical adsorption of 1-amino-2-naphthol and its hydrochloride to suspended solids and sediments may not be a significant fate process.

In air, vapor phase 1-amino-2-naphthol and its hydrochloride salt may be degraded by reaction with photochemically generated HO radical or by direct photolysis. The hydroxyl reaction half-life of 1-amino-2-naphthol is

estimated to be 12.66 hours. Reaction with ozone may occur but no rate constant was located. Dissolution into and removal by rain may be a potential transport process for 1-amino-2-naphthol•HCl.

In soil, 1-amino-2-naphthol and its hydrochloride salt should not be susceptible to substitution reactions (hydrolysis). 1-Amino-2-naphthol and its hydrochloride are likely to be mobile in soil.

3. EXPOSURE

Pertinent data regarding the monitoring of 1-amino-2-naphthol or its hydrochloride could not be located in the available literature as cited in the Appendix.

4. PHARMACOKINETICS

Pertinent data regarding the absorption, distribution, metabolism or excretion of 1-amino-2-naphthol and 1-amino-2-naphthol•HCl could not be located in the available literature as cited in the Appendix.

5. EFFECTS

5.1. CARCINOGENICITY

Paraffin pellets, either unaltered or containing 1-amino-2-naphthol•HCl, were implanted in the bladders of albino mice (Bonser et al., 1956). According to NIOSH (1986), the dose of implanted 1-amino-2-naphthol•HCl was 100 mg/kg, but Bonser et al. (1956) did not report a dosage. The mice were maintained for 40 weeks, at which time the survivors were killed. There was no significant difference in mortality between the control and experimental group. All mice that died or were killed at the end of the experiment were examined for bladder tumors. No other endpoints were evaluated. Two carcinomas, three benign tumors and nine areas of squamous metaplasia were reported in the 56 mice implanted with the unaltered pellets. The 36 mice implanted with pellets containing 1-amino-2-naphthol•HCl had 10 carcinomas ($p=0.001$, Fisher exact test), 8 benign tumors ($p=0.019$) and 18 areas of squamous metaplasia. Details as to whether the carcinomas were squamous or transitional cells were lacking.

Pertinent data regarding the carcinogenicity of ingested or inhaled 1-amino-2-naphthol or 1-amino-2-naphthol•HCl could not be located in the available literature as cited in the Appendix; these chemicals are not scheduled for testing by the National Toxicology Program (NTP, 1986).

5.2. MUTAGENICITY

As indicated in Table 5-1, 1-amino-2-naphthol•HCl was not mutagenic to Salmonella typhimurium strains TA1535, TA1538, TA1537, TA98 or TA100 either with or without metabolic activation (Garner and Nutman, 1977; Chung et al., 1981). Chung et al. (1981) reported that 1-amino-2-naphthol•HCl was toxic to S. typhimurium at concentrations >25 µg/plate.

TABLE 5-1

Mutagenicity Testing of 1-Amino-2-naphthol·HCl and 1-Amino-2-naphthol

Assay	Indicator Organism	Compound/Purity	Application	Concentration or Dose	Activating System	Response	Comment	Reference
Reverse mutation	Salmonella typhimurium TA1535, TA1537, TA1538, TA98, TA100	≥96% (1-amino-2-naphthol·HCl)	plate incorporation	≤25 µg/plate	± S-9	-	1-amino-2-naphthol·HCl was toxic at concentrations >25 µg/plate	Chung et al., 1981
Reverse mutation	S. typhimurium TA1538	purified (1-amino-2-naphthol·HCl)	plate incorporation	50 or 100 µg/plate	± S-9	-	bacterial toxicity was not addressed	Garner and Nutman, 1977
Rec assay	Escherichia coli, P3478 (pol A⁻), P3110 (pol A⁺)	NR (1-amino-2-naphthol·HCl)	spot test	500 µg/well	none	+	authors caution that oxidizing agents may give false positive reactions	Fluck et al., 1976
Reverse mutation	E. coli	NR (1-amino-2-naphthol·HCl)	spot test	solid crystals	none	-	NC	Perez and Radomski, 1965

NR = Not reported; NC = no comment

Although Fluck et al. (1976) reported that 1-amino-2-naphthol•HCl was mutagenic to Escherichia coli in the DNA repair assay (rec assay) without metabolic activation, these investigators caution that the positive result may have been due to the oxidizing potential of the compound. 1-Amino-2-naphthol was not mutagenic to E. coli in a reverse mutation assay without activation (Perez and Radomski, 1965).

5.3. TERATOGENICITY

Pertinent data regarding the teratogenicity of 1-amino-2-naphthol or 1-amino-2-naphthol•HCl could not be located in the available literature as cited in the Appendix.

5.4. OTHER REPRODUCTIVE EFFECTS

Pertinent data regarding the other reproductive effects of 1-amino-2-naphthol or 1-amino-2-naphthol•HCl could not be located in the available literature as cited in the Appendix.

5.5. CHRONIC AND SUBCHRONIC TOXICITY

Pertinent data regarding the chronic and subchronic toxicity 1-amino-2-naphthol or 1-amino-2-naphthol•HCl could not be located in the available literature as cited in the Appendix.

5.6. OTHER RELEVANT INFORMATION

LD_{50} values could not be located in the available literature.

In order to assess the effects of dyes and indicator chemicals on the rate of liver regeneration, groups of male Charles River rats had 2/3 of the liver removed under ether anesthesia (Gershbein, 1982). One group of 13 rats was fed a diet containing 0.20% 1-amino-2-naphthol•HCl for 10 days. A control group of 16 male rats was fed an uncontaminated diet. There was a significant increase ($p<0.05$ in t-test) in the regenerating liver weights

Although Fluck et al. (1976) reported that 1-amino-2-naphthol•HCl was mutagenic to Escherichia coli in the DNA repair assay (rec assay) without metabolic activation, these investigators caution that the positive result may have been due to the oxidizing potential of the compound. 1-Amino-2-naphthol was not mutagenic to E. coli in a reverse mutation assay without activation (Perez and Radomski, 1965).

5.3. TERATOGENICITY

Pertinent data regarding the teratogenicity of 1-amino-2-naphthol or 1-amino-2-naphthol•HCl could not be located in the available literature as cited in the Appendix.

5.4. OTHER REPRODUCTIVE EFFECTS

Pertinent data regarding the other reproductive effects of 1-amino-2-naphthol or 1-amino-2-naphthol•HCl could not be located in the available literature as cited in the Appendix.

5.5. CHRONIC AND SUBCHRONIC TOXICITY

Pertinent data regarding the chronic and subchronic toxicity 1-amino-2-naphthol or 1-amino-2-naphthol•HCl could not be located in the available literature as cited in the Appendix.

5.6. OTHER RELEVANT INFORMATION

LD_{50} values could not be located in the available literature.

In order to assess the effects of dyes and indicator chemicals on the rate of liver regeneration, groups of male Charles River rats had 2/3 of the liver removed under ether anesthesia (Gershbein, 1982). One group of 13 rats was fed a diet containing 0.20% 1-amino-2-naphthol•HCl for 10 days. A control group of 16 male rats was fed an uncontaminated diet. There was a significant increase ($p<0.05$ in t-test) in the regenerating liver weights

(2.363±0.118 g) in rats ingesting 1-amino-2-naphthol•HCl compared with those weights (2.001±0.068 g) in the controls. No other effects of dietary exposure to 1-amino-2-naphthol•HCl were reported.

5.7. SUMMARY

Implantation of paraffin pellets containing 1-amino-2-naphthol•HCl into the bladders of mice resulted in an increased number of carcinomas, benign tumors and areas of squamous metaplasia after 40 weeks compared with mice implanted with paraffin only (Bonser et al., 1956). 1-Amino-2-naphthol•HCl was not mutagenic to S. typhimurium with or without metabolic activation (Garner and Nutman, 1977; Chung et al., 1981). Although Fluck et al. (1976) found that 1-amino-2-naphthol was positive in a rec assay in E. coli, these investigators speculated that the positive result may have been due to the oxidizing potential of the compound. 1-Amino-2-naphthol was not mutagenic to E. coli in a reverse mutation assay without activation (Perez and Radomski, 1965). Information was not found on the teratogenic or reproductive effects or on the systemic toxicity after subchronic or chronic ingestion or inhalation of 1-amino-2-naphthol or 1-amino-2-naphthol·HCl. When mice were fed the compound for 10 days after partial hepatectomy, the result was a significant increase in the mass of regenerated liver tissue (Gershbein, 1982).

6. AQUATIC TOXICITY

Pertinent data regarding the toxicity of 1-amino-2-naphthol and 1-amino-2-naphthol•HCl to aquatic organisms could not be located in the available literature as cited in the Appendix.

7. EXISTING GUIDELINES AND STANDARDS

7.1. HUMAN

Pertinent guidelines and standards, including U.S. EPA ambient water and air quality criteria, drinking water standards, FAO/WHO ADIs, EPA or FDA tolerances for raw agricultural commodities or foods, and ACGIH, NIOSH or OSHA occupational exposure limits could not be located in the available literature as cited in the Appendix.

7.2. AQUATIC

Guidelines or standards for the protection of aquatic biota from the effects of 1-amino-2-naphthol and 1-amino-2-naphthol•HCl could not be located in the available literature as cited in the Appendix.

8. RISK ASSESSMENT

Implantation of paraffin pellets containing 1-amino-2-naphthol•HCl into the bladders of mice resulted in an increased number of carcinomas (type unspecified), benign tumors and areas of squamous metaplasia after 40 weeks compared with mice implanted with paraffin only (Bonser et al., 1956). 1-Amino-2-naphthol•HCl was not mutagenic to S. typhimurium with or without metabolic activation (Garner and Nutman, 1977; Chung et al., 1981). Although Fluck et al. (1976) found that 1-amino-2-naphthol was positive in a rec assay in E. coli, these investigators speculated that the positive result may have been due to the oxidizing potential of the compound. 1-Amino-2-naphthol was not mutagenic to E. coli in a reverse mutation assay without activation (Perez and Radomski, 1965). Information was not found on the teratogenic or reproductive effects or on the systemic toxicity after subchronic or chronic ingestion or inhalation of 1-amino-2-naphthol or 1-amino-2-naphthol•HCl. When mice were fed the compound for 10 days after partial hepatectomy, the result was a significant increase in the mass of regenerated liver tissue (Gershbein, 1982).

The inadequacy of available information on the carcinogenic potential, developmental and reproductive effects, and systemic toxicity after subchronic and chronic ingestion or inhalation of 1-amino-2-naphthol•HCl and 1-amino-2-naphthol precludes the derivation of a q_1^* or RfD.

9. REPORTABLE QUANTITIES

9.1. REPORTABLE QUANTITY (RQ) RANKING BASED ON CHRONIC TOXICITY

No chronic or subchronic oral or inhalation studies of 1-amino-2-naphthol or 1-amino-2-naphthol•HCl were located; therefore, data are insufficient to derive an RQ (Table 9-1).

9.2. WEIGHT OF EVIDENCE AND POTENCY FACTOR ($F=1/ED_{10}$) FOR CARCINOGENICITY

The only available information regarding the carcinogenicity of 1-amino-2-naphthol and 1-amino-2-naphthol•HCl was a study in which the hydrochloride in paraffin pellets was implanted into the bladders of mice (Bonser et al., 1956). After 40 weeks, bladder carcinomas were observed in 10/36 treated mice compared with 2/56 mice implanted with paraffin pellets alone ($p=0.001$). Bladder papillomas were observed in 8/36 treated versus 3/56 control mice ($p=0.019$). Although NIOSH (1986) indicated that the dose of 1-amino-2-naphthol•HCl in the Bonser et al. (1956) study was 100 mg/kg, Bonser et al. (1956) did not report a dose. Because the weight-of-evidence was deemed inadequate for assessing carcinogenic potential, this study cannot be used to derive a potency factor. Although 1-amino-2-naphthol•HCl produced an increased incidence in bladder tumors in mice when implanted in the bladder. Based on the lack of epidemiologic and suitable animal bioassay information by a relevant route and negative mutagenic information, it is appropriate using U.S. EPA Guidelines for Carcinogen Risk Assessment to classify both 1-amino-2-naphthol and 1-amino-2-naphthol•HCl as Group D compounds (not classifiable as to human carcinogenicity).

TABLE 9-1

1-Amino-2-naphthol and 1-Amino-2-naphthol•HCl:
Minimum Effective Dose (MED) and Reportable Quantity (RQ)

Route:	
Dose:	
Effect:	
Reference:	
RV_d:	
RV_e:	
Composite Score:	
RQ:	Data are not sufficient for deriving an RQ

10. REFERENCES

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APPENDIX

LITERATURE SEARCHED

This profile is based on data identified by computerized literature searches of the following:

GLOBAL
TSCATS
CASR online (U.S. EPA Chemical Activities Status Report)
CAS online STN International
TOXLINE
TOXBACK 76
TOXBACK 65
RTECS
OHM TADS
STORET
SRC Environmental Fate Data Bases
SANSS
AQUIRE
TSCAPP
NTIS
Federal Register

These searches were conducted in April, 1986. In addition, hand searches were made of Chemical Abstracts (Collective Indices 6 and 7), and the following secondary sources were reviewed:

ACGIH (American Conference of Governmental Industrial Hygienists). 1986. Documentation of the Threshold Limit Values and Biological Exposure Indices, 5th ed. Cincinnati, OH.

ACGIH (American Conference of Governmental Industrial Hygienists). 1985-1986. TLVs: Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment with Intended Changes for 1985-1986. Cincinnati, OH. 114 p.

Clayton, G.D. and F.E. Clayton, Ed. 1981. Patty's Industrial Hygiene and Toxicology, 3rd rev. ed., Vol. 2A. John Wiley and Sons, NY. 2878 p.

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USITC (U.S. International Trade Commission). 1985. Synthetic Organic Chemicals. U.S. Production and Sales, 1984, USITC Publ. 1745, Washington, DC.

Verschueren, K. 1983. Handbook of Environmental Data on Organic Chemicals, 2nd ed. Van Nostrand Reinhold Co., NY.

Windholz, M., Ed. 1983. The Merck Index, 10th ed. Merck and Co., Inc., Rahway, NJ.

Worthing, C.R. and S.B. Walker, Ed. 1983. The Pesticide Manual. British Crop Protection Council. 695 p.

In addition, approximately 30 compendia of aquatic toxicity data were reviewed, including the following:

Battelle's Columbus Laboratories. 1971. Water Quality Criteria Data Book. Volume 3. Effects of Chemicals on Aquatic Life. Selected Data from the Literature through 1968. Prepared for the U.S. EPA under Contract No. 68-01-0007. Washington, DC.

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Pimental, D. 1971. Ecological Effects of Pesticides on Non-Target Species. Prepared for the U.S. EPA, Washington, DC. PB-269605.

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